BY ORDER OF THE COMMANDER
HQ AIR FORCE FLIGHT TEST CENTER
(AFMC) EDWARDS AIR FORCE BASE CA 93524

AFFTC INSTRUCTION 99-1

28 January 2002

Test and Evaluation

TEST PLANS

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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Certified by: 412 TW/CC (Col S. Cameron)
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The purpose of this Instruction is to establish the responsibilities and procedures for the development, review and approval of test plans for AFFTC, contractors and joint AFFTC/contractor test projects. It applies to all units, agencies and contractors for which the AFFTC is the responsible test organization (RTO) or participating test organization (PTO). It does not apply to USAF Test Pilot School curriculum plans; however, it does apply to non-curriculum plans. It also does not apply to test plans for which the AFFTC has no technical responsibility.

SUMMARY OF REVISIONS

The distribution list and office symbols were updated to reflect recent organizational changes and to add the AFFTC assigned test representative offices. References to other guidance documents were corrected or updated. AFFTC Form 5028, **Test Project Safety Review**, was added to para 4.5. Attachment 4 was updated to reflect current office symbols and to clarify intent.

Test Plans for tests conducted at the AFFTC must be approved from a technical as well as from a safety point of view. This Instruction addresses development, review, and approval of test plans from a technical point of view. Safety planning for AFFTC testing is covered by AFFTCI 91-5, *AFFTC Test Safety Review*.

1. General. Most test plans fall within the categories of management test plans and detailed test plans. Management plans for major programs are normally called System Test Plans and contain flight test management concepts and general (as opposed to detailed) test plans that only identify the types of tests to be accomplished. Test Information Sheets (TISs) are actually appendices to test plans and contain sufficient information for use by a flight test engineer to develop flight test cards and for management to discern the

overall technical approach being taken. Therefore, TISs are frequently the key documents that describe the specific tests to be accomplished and how they will be accomplished. In order to ensure proper and adequate preparation and planning, a thorough technical review is required of all Test Plans and associated TISs. A major revision to an existing plan must also be reviewed. In addition, a safety review of all TISs is required to identify potential hazards and determine minimizing procedures in accordance with AFFTCI 91-5 for all tests utilizing AFFTC assets. Both technical and safety reviews must be completed before testing begins.

2. References:

2.1. AFMCPAM 91-1, *Flight Safety and Technical Considerations Guide for Flight Testing*.

2.2. AFFTCI 91-5, *AFFTC Test Safety Review*.

2.3. AFI 91-202, *The US Air Force Mishap Prevention Program* (as supplemented).

2.4. AFMCPD 99-1, *Test and Evaluation (T&E) Risk Management*.

2.5. AFFTCI 99-4, *Flight Test Center Deficiency Reporting*.

2.6. AFFTCI 99-5, *Test Control and Conduct*.

2.7. AFI 99-101, *Developmental Test and Evaluation*.

2.8. AFI 99-106, *Joint Test and Evaluation*.

2.9. AFFTC-TIH-93-01, *Air Force Flight Test Center Test Plan Preparation Guide*.

3. Responsibilities.

3.1. Development of Plan. The designated project manager (PM) from the RTO is responsible for ensuring that AFFTC personnel prepare or make inputs to test plans as soon as possible. AFFTC personnel should also prepare or make thorough and timely inputs to detailed TISs through integrated product team meetings, test plan working groups or other means. The PM is also responsible for ensuring that test plans are prepared and submitted to the Office of Primary Responsibility (OPR) for Technical Review in time to allow comprehensive technical and safety reviews and to meet program requirements and schedules. The PM is also responsible to assure that test plans are properly coordinated and ready for the required reviews. Copies of the plan will be provided as soon as it is ready for a technical review but normally no later than six weeks before the start of testing and no later than five working days before the scheduled technical review.

3.2. Establishment of a Technical Review and Technical Review Board (TRB).

3.2.1. All test plans shall receive a technical review. The technical review may take any form from the Division Chief or 2-letter level individual reviewing it themselves, to a formal TRB with numerous stakeholders present. The intent of a technical review is to establish a committee of experienced personnel not intimately associated with the project to provide an independent technical assessment and executive review of the plan. It is the responsibility of the OPR to ensure an adequate review of the plan from a technical standpoint. The OPR for technical review should have expertise in all the test areas that will allow adequate review of the plan. If the OPR does not have sufficient expertise in the appropriate areas the OPR shall request assistance from the appropriate AFFTC organizations. All appropriate organizations will support the technical reviews as requested by the OPR and PM.

3.2.1.1. Normally, the OPR will be one of the following: 412 TW/CA, 412 TW/EN, 412 TW/EW, 412 TW/ENF, 412 TW/ENR, 412 TW/ENV, 412 TW/EWD, 412 TW/EWW.

3.2.1.2. Other equivalent level offices may exercise OPR authority for test projects under their management, so long as adequacy and independence of the technical assessments are maintained.

3.2.1.3. The technical review process is started by the PM submitting the test plan to 412 TW/CA who will assign the appropriate OPR. The OPR will normally be the three-letter organization (division) that has the bulk of the testing in the plan. In cases where a test plan incorporates many different disciplines or has high political visibility, an OPR higher than the division level may be chosen. The two-letter organizations always maintain the option to review the test plans themselves. See attachment 4 for detailed instructions.

3.2.2. The OPR will determine whether or not a formal TRB is required. A formal TRB is a face-to-face meeting that includes project personnel and the test plan reviewers. That decision will be based on the OPR's judgment about adequacy of the technical planning, similarity to previously reviewed plans, complexity of the proposed test, and similar aspects. If a TRB is required, the OPR will ensure that the board is made up of experienced personnel to include at least operations and engineering personnel. These personnel should be chosen on the basis of their experience in areas addressed in the plan. The expertise should not be limited to that dictated by the test program objectives, but should be broad enough for these individuals to critically review all aspects of the planned test. The PM and operations and engineering personnel responsible for conducting and supporting the test program will participate in the review as consultants. Appropriate contractor representatives should also be invited. The OPR should ensure that notification of the time, date, and location of the TRB meeting and the test plan are distributed at least five working days before the meeting.

3.2.3. If a TRB is not deemed necessary, the OPR should ensure that any feedback is provided to the responsible test agency. Test agencies can hold their own preliminary review of plans, but this does not constitute the independent review required by this instruction.

4. Procedures.

4.1. Overall Process. Attachment 1 shows the overall process for detailed test plan and/or TIS development. The following paragraphs amplify significant parts of the process.

4.2. Preparation of the Plan. In preparing the test plan the author should refer to Attachment 2 and reference 2.7.

4.2.1. The RTO will ensure that a test plan is prepared to meet the objectives mutually agreed to by the AFFTC, the Program Management Office (PMO) or other customer, and participating agencies. Specifications, operational requirements, and management plans, such as Test and Evaluation Master Plans, Project Management Plans and the System Operation Requirement Document (SORD) should be used as sources for objectives, issues and items that require management emphasis. If necessary, Test Plan Working Group sessions should be held with appropriate organizations, including contractors, to ensure a plan is ready for a technical review.

4.2.2. A TIS will be used to define and amplify specific tests identified in a system test plan and will either stand alone or be a part of an overall plan that is general in nature. In either case, a TIS will have sufficient information for a flight test engineer to develop flight test cards, and for man-

agement to discern the overall technical approach being taken. Attachment 3 lists the information required.

4.2.3. For AFFTC TISs, AFFTC Form 5232b, **AFFTC Test Information Sheet** (with signature blocks), will be used as the cover sheet for stand-alone plans and AFFTC Form 5232a**, AFFTC Test Information Sheet**, for TISs that are included in overall plans. The AFFTC Form 5232b will also be used as a cover sheet for contractor-prepared detailed test plans which come under the purview of this regulation. The TIS will contain background and authority information for the test to be performed, leading the reader to better understand the test plan attached to the form. AFFTC project managers will prepare the forms in the appropriate number of copies for the test agency. Copies are distributed to the management office, contractor, and using command as needed. Internal distribution is made as determined by the project manager.

4.3. Review of the Plan.

4.3.1. The OPR for Technical Review shall conduct a technical review as specified in the responsibilities section of this OI and follow the procedures as specified below.

4.3.2. If a formal TRB is convened then each TRB will start with a briefing by personnel from the test organization. The briefing will include a summary of the test objectives, status of the development of the test item and operational limitations, proposed overall test procedures, instrumentation, data requirements and the philosophy used in establishing these items. Data handling and analysis plans will also be briefed. Potentially high risk tests from a technical standpoint will be identified and their relationship to sequence of testing and known development problems will be addressed.

4.3.3. A detailed technical review of the test plan will then be accomplished. This discussion will cover the program objectives, status of preparation and planning, executability of the plan, predicted test item characteristics associated with individual tests, review of the test matrix and test procedures, adequacy of the test effort, technical go/no-go criteria, alternate courses of action, resources needed and available, and other items important to test planning. Preliminary aspects of safety planning for the test program should be discussed. Attachment 2 contains a checklist to aid in the process. Action items and recommendations will be identified. These could include additional studies or analyses, qualification tests or unique recommended training or the addition and deletion of test points. The TRB minutes will contain an overall assessment of the plan and address each of the above items as appropriate. The TRB minutes, including a list of attendees, will accompany the plan during final coordination and approval.

4.4. Finalization and Submission of Plan for Approval.

4.4.1. The OPR will write a letter to the test organization stating who reviewed the test plan and attach the TRB minutes, recommendation, action items or comments as appropriate (see Attachment 4 for detailed policy and instructions). The RTO will modify the plan to incorporate the appropriate recommendations from the technical review. Any recommendations or action items not incorporated will be addressed in a memorandum for the record explaining the reason for the noncompliance.

4.4.2. Following the technical review, a package will be prepared for submission by the test organization to include the test plan, signature page, and memorandum for the record explaining reasons for noncompliance with recommendations or action items. These documents will normally be included in the Test Documentation Package as specified in AFFTCI 91-5. If there is noncompli-

ance with technical review recommendations, then it is highly advisable to coordinate with the technical review OPR in advance of submitting the Test Documentation Package to prevent delays in the approval cycle.

4.5. Plan Approval. Approval of the test plan will normally be accomplished concurrently with the approval of AFFTC Form 5028 as described in AFFTCI 91-5. The approval authority for the test plan is the same as for the AFFTC Form 5028. This does not preclude early coordination of the test plan itself for concurrence by coordinating officials. Coordinating officials will sign the AFFTC Form 5232b, Test Information Sheet (TIS) sheet, indicating their concurrence or non-concurrence, and whether they have comments. Any comments during coordination will be written on the back of the TIS sheet and signed. Approval of the test plan and Form 5028 (reference AFFTCI 91-5) will be obtained before testing. The PM will ensure that a copy of the approved Test Plan and/or TIS is filed in the AFFTC Technical Library for reference and historical information.

4.6. Distribution of Plan. Following approval of the plan, distribution will be made to organizations requiring the plan for participation or support.

5. Test Plan Changes. Before or during a test program, changes can occur which necessitate a revision of the original test plan or TIS. These changes could be due to unexpected simulator results or flight test results, unexpected safety impacts, changes in management emphasis or specification requirements, or other causes. The PM is authorized to determine whether a revision is minor or major. Minor changes include changing flight conditions of test points as long as they are within the envelope of test points approved in the original plan, adding test points within the envelope of test points approved in the original plan, deleting test points if preliminary results show they are unnecessary and are not part of a safety build up.. A major revision is defined to be any change to test objectives, technical approach or test methodology, or substantive changes to test procedures. If there is any question about whether a change is minor or major the PM should consult with senior supervisory personnel. A minor change does not require a new technical review. For a major change, the technical review and approval process is identical to that for the original test plan. The PM shall document the change and reasons for it. Based on this documentation, the OPR will determine whether a TRB is required. In determining the need for a TRB, the OPR will consider the extent of the changes, results of testing to date, predicted results of proposed testing, and other pertinent details. Regardless of the need for a TRB, a Test Documentation Package must be prepared for the test plan revision in accordance with AFFTCI 91-5. If a TRB is not required, the same letter mentioned in para 4.4.1, from the OPR to the test agency stating this , must be included in the Test Documentation Package.

6. Forms Prescribed:

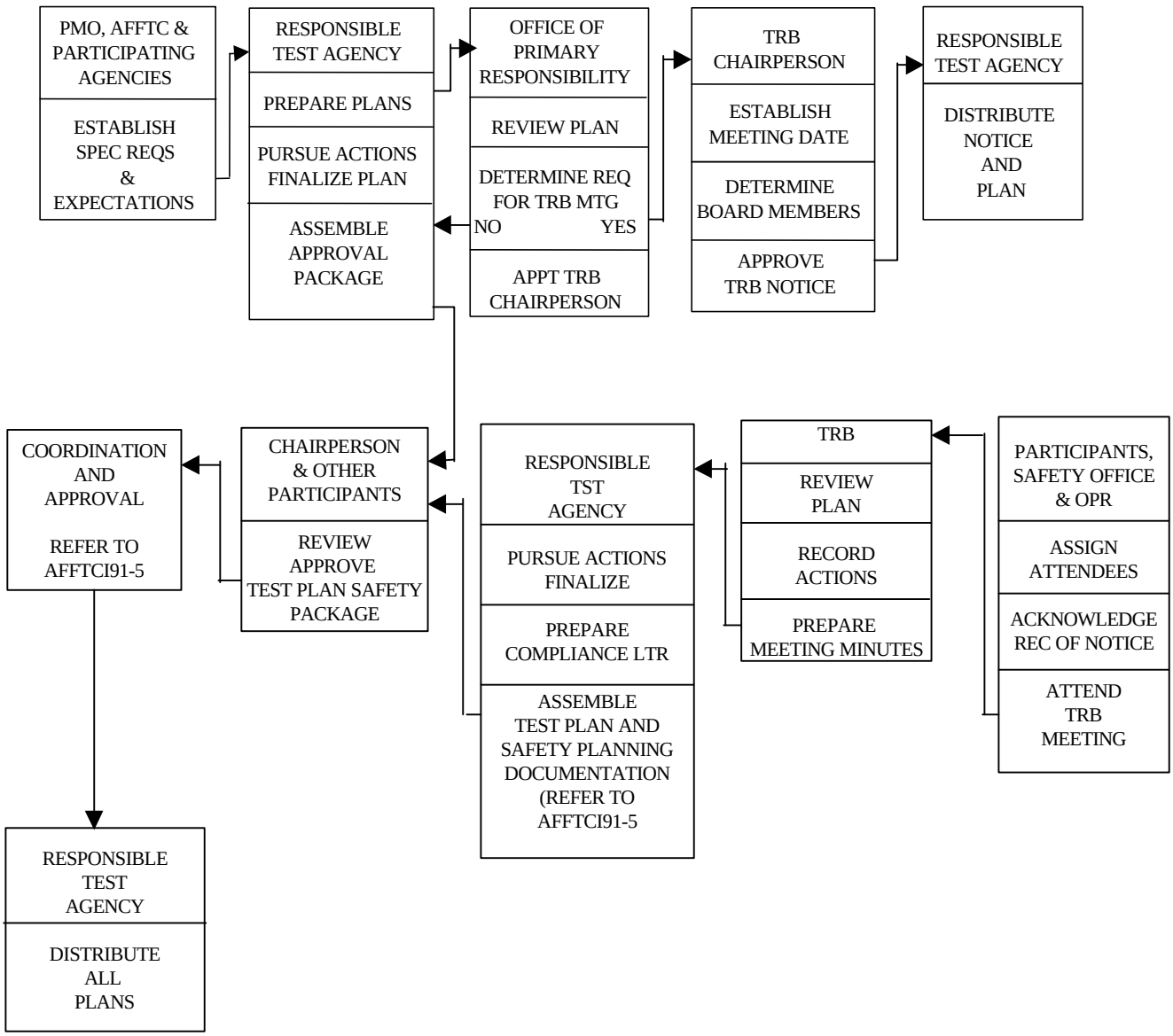
6.1. AFFTC 5232a, **AFFTC Test Information Sheet** (without signatures). See attachment 3.

6.2. AFFTC 5232b, **AFFTC Test Information Sheet** (with signatures).

WILBERT D. PEARSON, JR., Major General, USAF
Commander

Attachment 1

AFFTC TEST PLAN PROCESSING



Attachment 2

TEST PLAN CHECKLIST

TEST PLAN CONTENT [1]	**TECHNICAL REVIEW BOARD** [2]
General	
- Background info and purpose of test	- Has past experience with similar testing been used in preparing test plan?
- Critical technical issues	- When will test end (i.e., flown all test points, when system or component works as advertised)?
- Project management emphasis	- Have appropriate lessons learned been reviewed and necessary test modifications incorporated?
- OT&E and/or user participation	- What are technical risks (i.e., are we doing anything that has never been done before; that will require extreme talent; that we are not sure we can do; that depends on resources that are "iffy." Are we biting off more than we can chew)?
- Participating test organization and responsibilities	- Will production decisions depend on test results and analysis?
- Program authority, AF precedence rating and AFFTC priority	- What is extent of government and/or contractor participation?
- Responsible test agency	- Will this testing lead toward getting the system ready for OT&E?
- Security classification	
- Test location	
- Executability	
Project Management	
- Organization	Has the overall project management and organization been identified
- Schedule	-- Has a schedule been prepared showing all major milestones?

TEST PLAN CONTENT [1]	TECHNICAL REVIEW BOARD [2]
Test Item Description	
- Aircraft and Systems (as related to test)	- Are the specific aircraft or test items and predicted operating characteristics clearly defined and understood?
- Peculiar configurations	- What are differences between test item and production article?
- Test apparatus	- Will the latest production configuration be available for test? If not, is there enough time in the schedule to test final configuration?
	- How will software configuration be controlled/tracked?
	- Will RTO participate in all software configuration exchange decisions?
	- What is considered the baseline configuration?
Test Objectives	
- General	- Do AFFTC objectives cover critical developmental and operating concerns?
- Specific	- Have specific measures of performance been identified for each objective?
- Evaluation Criteria	- Are operating concerns shaped by system effectiveness or user employment?
	- What will define satisfactory system performance?
	- Why is test required?
	- Are test objectives clearly defined?
	- Do objectives fall within AFFTC mission?
	- To what extent do AFFTC objectives differ from or duplicate contractor objectives?
	- Is additional info required from management office?
	- Are the objectives achievable and complete?
	- What is required in management directives & plans (e.g., AFI 99-101, Test and Evaluation Master Plan, System Test Plan)?
	- Are objectives prioritized in order to ensure some success on extremely limited schedules?
	- What are success criteria? Do they give a measurable determination? Do you know when the test is completed?
	- Are expected results kept out of the wording of the objectives?

TEST PLAN CONTENT [1]	**TECHNICAL REVIEW BOARD [2]**
Test Conditions & Procedures/ Techniques	
- Description of tests	- Does the concept of the test relate directly to test objectives?
- Number of flights/flight time	- Is the planned sequence of testing logical from a technical viewpoint?
- Limitations/Constraints	- Is a build-up approach used?
- Specific conditions & Procedures	- Are the tests the absolute minimum necessary to satisfy the test objectives?
- Test Maneuver Description	
	- Is there a possibility that critical limits will be exceeded?
	- Has the interrelationship between various tests been assessed and properly accounted for?
	- Are test conditions and tolerance (Mach, altitude) reasonable?
	- Have contractor studies (wind tunnel tests, or test cell evaluations) been conducted that relate to planned testing? If so, have the results been given proper consideration? Are the results available to AFFTC?
	- Have rules for decisions whether or not to proceed with testing been adequately established?
	- Have abnormal test situations been anticipated and adequate procedures developed?
	- What criteria or philosophy was used to determine the sample size?
	- Has the number of times each item is to be tested been included?
	- Was overall test effort scoped with logical approach about how many flights/duration and how many months the test will take?
	- Are special techniques required, available, and understood?
	- Have data from contractor qualification and other testing been taken into account?
	- What models and/or simulations have been or will be used to reduce test asset requirements, establish statistical confidence levels, and reduce overall testing time and/or cost?
	- What priorities have been put into the test matrix?
	- When/how is it decided that test/test points are "completed"?

TEST PLAN CONTENT [1]	TECHNICAL REVIEW BOARD [2]
	- Are test conditions controlled and procedures designed to ensure repeatability?
	- Will results be comparable with previous tests?
	- What are the plans for regression testing of software-intensive systems?
	- Are conditions operationally representative enough?
	- Will results be conclusive enough to satisfy specification compliance?
	- If tracking is required, have all test/runs been serialized?
Instrumentation System	
- General description	- Are planned instrumentation systems adequate (ground, flight, and data systems)?
- Parameters	- Is adequate time available to thoroughly check instrumentation/data production cycle before first data flight?
- Calibration procedures	- What are go/no-go parameters for both safety-of-flight and technical requirements?
	- Are proposed accuracy's and sensitivities adequate? Are system noise levels attenuated to an acceptable level?
Data Processing and Analysis Requirements	
- Data requirements	- Is sufficient time allowed between tests for data turn-around and analysis?
- Data distribution plan	- Are the data processing procedures in place?
- Processing and analysis plan	- Has analysis plan been formulated? Will the data address the test objectives?
	- What are requirements for encrypted data?
	- To what extent will government analysis be independent from contractor's?
	- Are routines being developed for each of the various generation levels of analysis and will they be ready when required? How will they be verified?
	- Have algorithms been defined in order to answer each measure of performance?

TEST PLAN CONTENT [1]	TECHNICAL REVIEW BOARD [2]
Special Support Requirements	
- Equipment	- Are planned test facilities (government and contractor) adequate?
- Range	- Have primary and alternate range configurations been identified?
- Manpower	- Are there any peculiar offsite requirements?
- Test facilities	- Are key test personnel identified?
- Training	- Are qualified personnel available to conduct tests?
- Unique tech support requirements	- Has adequate consideration been given to use of simulation?
- Maintenance	- Is planned training and indoctrination adequate?
	- Have support agencies been identified and tasked?
Reporting	
- AFFTC	- Have all technical and service reporting requirements been addressed with customer agreed-to due dates?
- Customer Requirements	- Will expected test results and analysis answer objectives?
- Preliminary report of results	- Are reporting requirements and milestones clearly understood?
- Service reporting	- Are reporting responsibilities for each organization understood?
- Technical reporting	
- Contractor	
Safety	
- Test planned for safe completion	- Is test project safety planning in progress in accordance with AFFTCI 91-5, Safety Planning for AFFTC Tests?
- Crew training	- Can identified hazards be minimized, consistent with accomplishment of test objectives?
- Contractor tests with Air Force involvement	- Are safety go/no-go criteria established?
- Test execution authority	
Security	
- OPSEC	- Have requirements for operations security been considered?
- COMSEC	- If program is classified, can you live with security classifications guides? What must be changed and why? Are sufficient type and number of support personnel "briefed in" to allow proper and timely support?
	- If special OPSEC/COMSEC procedures are required, are they defined in the document or reference?

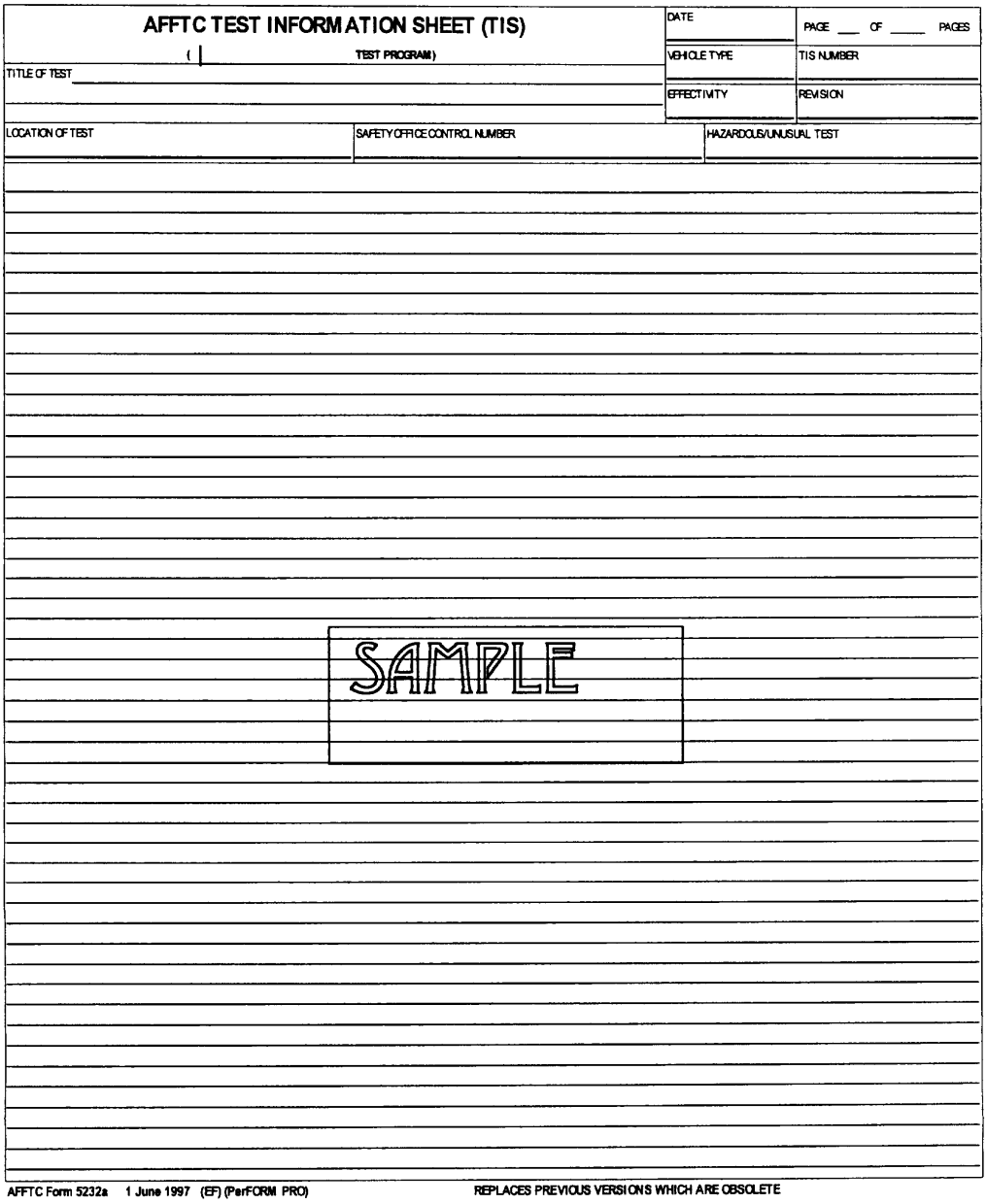
TEST PLAN CONTENT [1]	TECHNICAL REVIEW BOARD [2]
References	
- Test Plans	- Have all appropriate management, technical, and safety sources been included?
- Reports	
- Specifications	
- Class II modification documentation	
- Studies	
- Data Analysis Plans (AFFTC and Contractor)	

(1) This checklist is a guideline for the type of information that should be considered during test plan preparation. The basic topics (General, Test Item Description, etc.) should be considered for all plans. Appropriate sub-items can be used or combined as appropriate.

(2) This checklist is intended to ensure that all relevant areas are specifically addressed. Some of the questions may not have clear answers but as a minimum should be surfaced and understood

Attachment 3

SAMPLE TIS SHEET



AFFTC TEST INFORMATION SHEET (TIS)

(| TEST PROGRAM)

DATE

PAGE ___ OF ____ PAGES

TITLE OF TEST

VEHICLE TYPE

TIS NUMBER

EFFECTIVITY

REVISION

LOCATION OF TEST

SAFETY OFFICE CONTROL NUMBER

HAZARDOUS/UNUSUAL TEST

SAMPLE

AFFTC Form 5232a 1 June 1997 (EF) (PerFORM PRO)

REPLACES PREVIOUS VERSIONS WHICH ARE OBSOLETE

AFFTC TEST INFORMATION SHEET (TIS) (_____ Test Program)	DATE _____	PAGE ___ OF ___ PAGES
TITLE OF TEST	VEHICLE TYPE	TIS NUMBER
	FIRST TEST DATE	REVISION
LOCATION OF TEST	SAFETY OFFICE CONTROL NUMBER	HAZARDOUS/UNUSUAL TEST

SAMPLE

COORDINATION AND APPROVAL

POSITION TITLE	SIGNATURE	DATE	ACTION (PREPARE, COORD, APPROVE, INFO)	COMMENTS ADDED YES	COMMENTS ADDED NO
AUTHOR _____		_____	PREPARE		
SQUADRON COMMANDER OR EQUIVALENT _____		_____	COORD	_____	_____
TEST WING ENGINEERING OR EQUIVALENT _____		_____	COORD	_____	_____
GROUP COMMANDER OR EQUIVALENT _____		_____	COORD	_____	_____
TEST WING COMMANDER OR EQUIVALENT _____		_____	APPROVE	_____	_____
AFFTC COMMANDER (OR AS DELEGATED) _____		_____	INFO	_____	_____

AFFTC FORM 5232b May 97 (EF) PerFORM PRO Replaces AFFTC Form 5232b, Jul 92, which will not be used

Attachment 4

TW/CA LETTER, DETAILING REVIEW PROCEDURES

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 412TH TEST WING (AFMC)
EDWARDS AIR FORCE BASE CALIFORNIA

28 Jan 02

MEMORANDUM FOR: All 412 TW Organizations

SUBJECT: Test Plan Technical Review Process

All test plans (TIS, DTIS, FTWO, etc.) under 412 Test Wing cognizance involving AFFTC resources will receive an independent technical review.

The Test Wing point of contact for technical reviews will be 412 TW/CA.

When the project personnel believe they have a test plan ready for the independent technical review (which means after all the TPWG and other working meetings with technical experts or supervisory personnel are complete), the project manager or lead project engineer will deliver a copy of the plan to 412 TW/CA.

The TW/CA will then appoint an OPR for the technical review and recommend level of and participation in the technical review. The OPR will ensure an independent technical review is accomplished in accordance with AFI 99-101, and AFFTCI 99-1.

When the review is complete, the OPR will sign and issue one of the following standard "technical adequacy" letters. The letter will be addressed to the test organization and will be given to the project manager or lead project engineer for inclusion in the "safety package."

Case 1. The test plan is adequate as written with no changes required:

"The subject test plan was reviewed by (names and office symbols of all reviewers) and is technically adequate."

Case 2. The test plan is adequate with the addition of a few comments or minor changes (few and minor are defined as, can be included in the technical adequacy letter on one page).

"The subject test plan was reviewed by..(name and office symbols of all reviewers) and with the addition of the following is technically adequate: (list the additions or changes; one page or less)."

Case 3. The changes or additions are longer than one type written page. This is a good indication that a TRB should be held.

"The subject test plan was reviewed by..(names and office symbols of all reviewers). Questions, comments, or action items that must be addressed prior to final approval are noted in the attachment." Attach the items or the minutes of the TRB.

When the test plan "safety package" is circulated for final approval the test organization must include a memo in the "safety package" addressing the resolution of the questions, comments or action items.

ROGER C. CRANE
Senior Technical Advisor